

## Mitosis vs. Meiosis

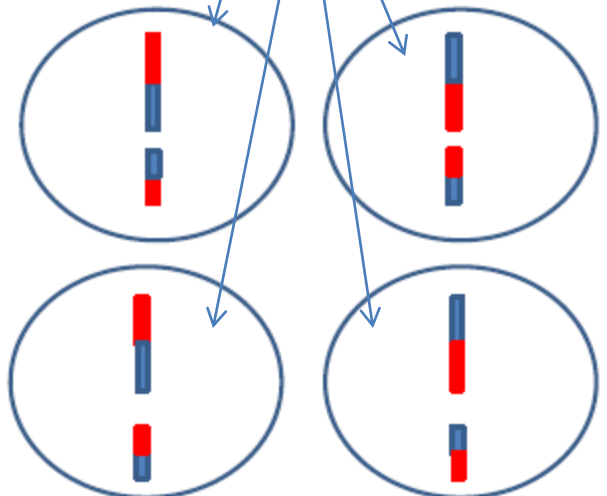
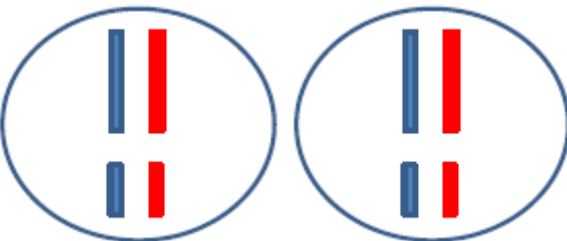
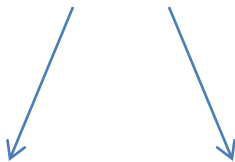
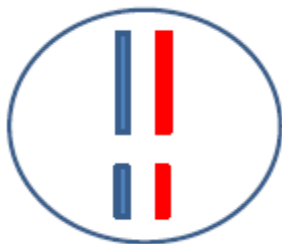
# Main Goals

## MITOSIS

- SOMATIC CELLS TO REPLACE EXISTING CELLS.
- 2 IDENTICAL DAUGHTER CELLS FROM 1 PARENT CELL DIVIDING ONCE.
- PLOIDY LEVEL IS DIPLOID  $2n$ : TWO COPIES OF EACH HOMOLOGOUS CHROMOSOME.

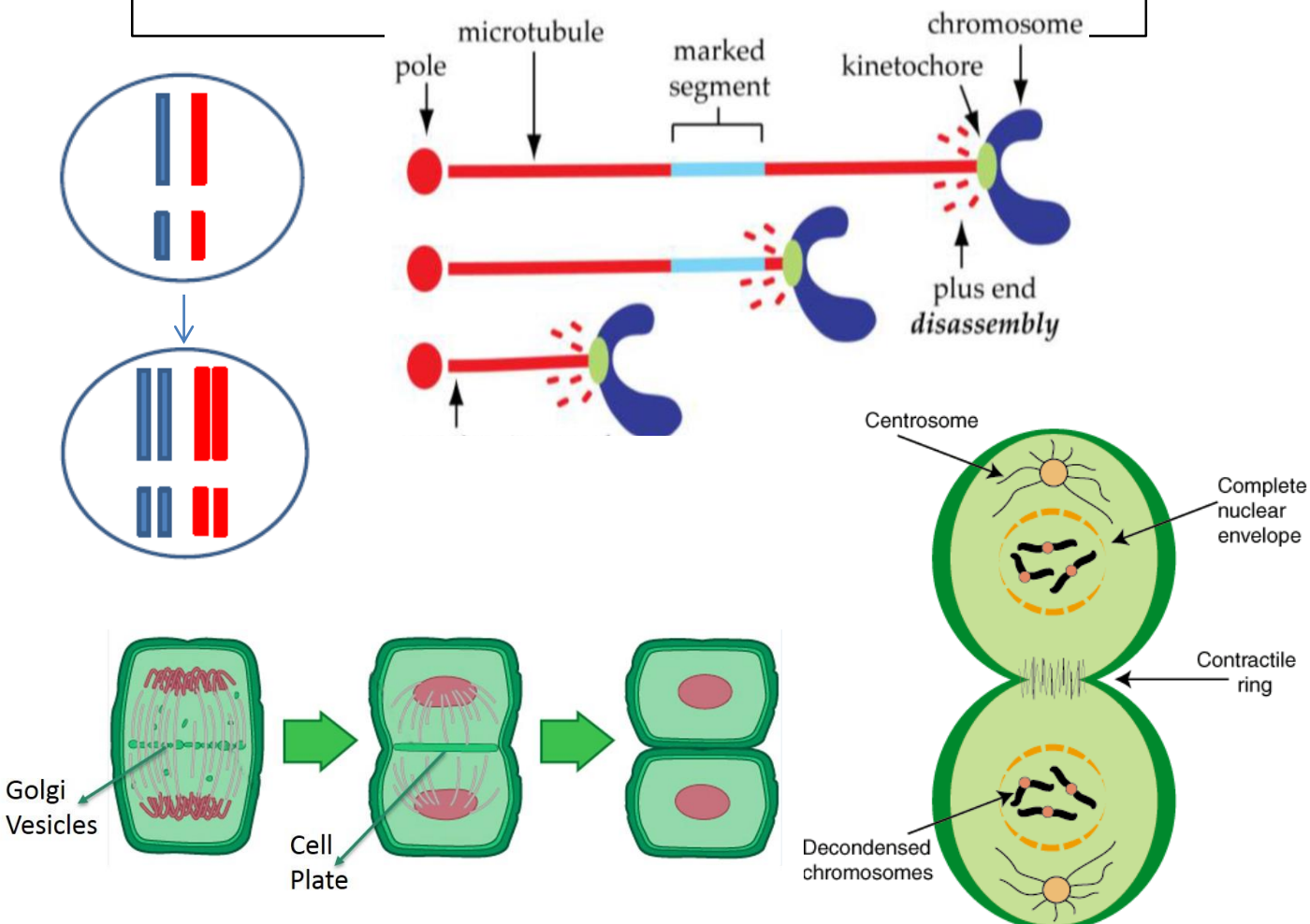
## MEIOSIS

- GAMETE CELLS TO BE USED IN FERTILIZATION.
- 4 GENETICALLY DIVERSE DAUGHTER CELLS FROM 1 PARENT CELL DIVIDING TWICE.
- PLOIDY LEVEL IS HAPLOID  $n$ : ONE COPY OF EACH HOMOLOGOUS CHROMOSOME.



# Similarities

- PARENT CELL GOES THROUGH G1, S & G2 OF INTERPHASE.
- S-PHASE IDENTICALLY DUPLICATES EACH INITIAL HOMOLOGOUS CHROMOSOME.
- CHROMOSOMES ALIGN IN CENTER DURING METAPHASE.
- SPINDLE FIBERS PULL APART DNA BY ATTACHING TO KINETOCHORE REGION ON CENTROMERE.
- CYTOKINESIS DIVIDES CYTOPLASM, CELL MEMBRANE & CELL WALL (IF PRESENT).



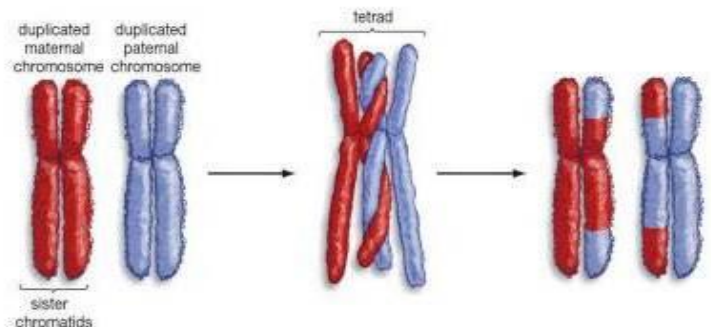
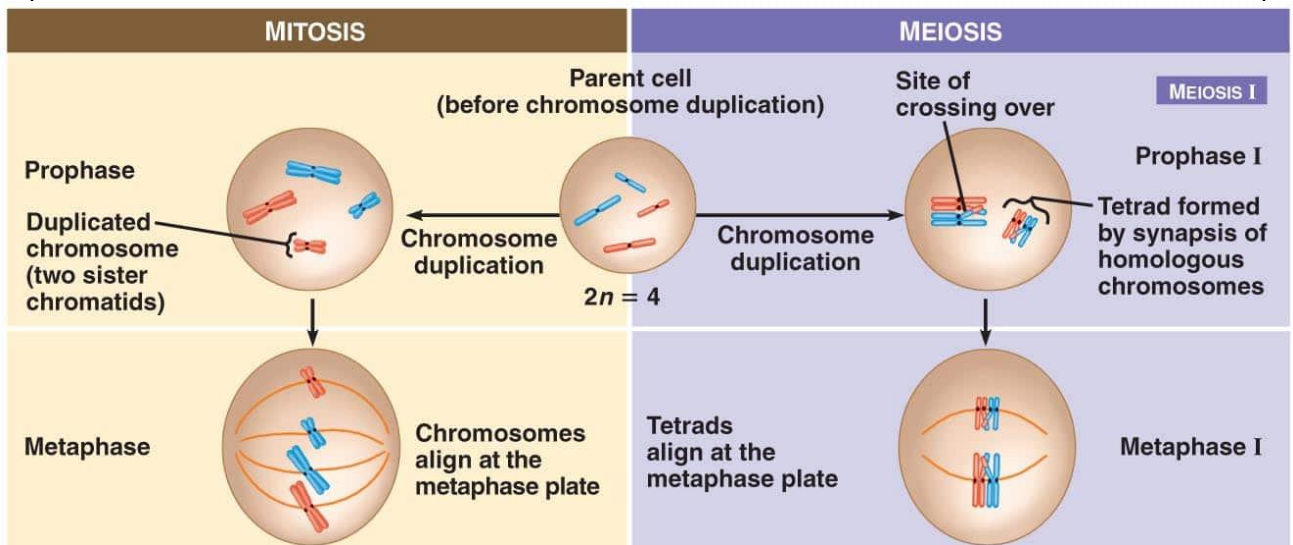
# CHROMOSOME ACTION DIFFERENCES

## MITOSIS

- **PROPHASE:** NUCLEAR MEMBRANE DEGRADED. DUPLICATED HOMOLOGOUS CHROMOSOMES DO NOT INTERACT.
- **METAPHASE:** EACH DUPLICATED HOMOLOGOUS CHROMOSOME ALIGNS SINGLE-FILE AT CENTER OF CELL.

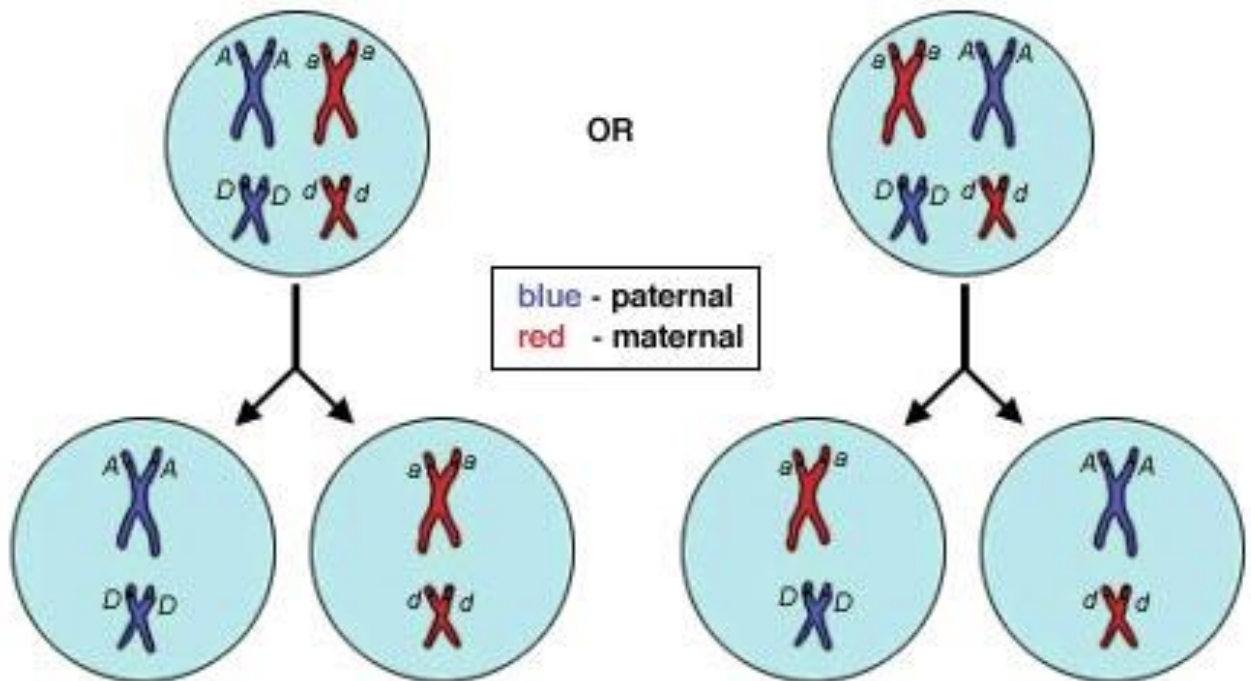
## MEIOSIS

- **PROPHASE 1:** NUCLEAR MEMBRANE DEGRADED. DUPLICATED HOMOLOGOUS CHROMOSOMES UNDERGO SYNAPSIS & TRANSLOCATION OF DNA (CROSSING-OVER).
- **METAPHASE 1:** DUPLICATED HOMOLOGOUS CHROMOSOMES ALIGN AS PAIRS AT CENTER OF CELL.



# METAPHASE 1

- BESIDES DIVERSITY FROM CROSSING OVER, THE ALIGNMENT OF CHROMOSOMES IS ALSO RANDOM.
- INDEPENDENT ASSORTMENT LEADS TO MANY POSSIBLE CHROMOSOME ARRANGEMENTS, THUS MANY POSSIBLE GAMETES.





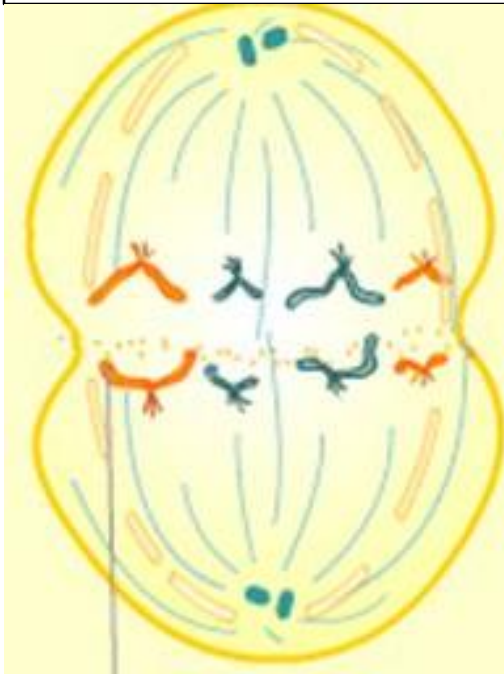
# CHROMOSOME ACTION DIFFERENCES

## MITOSIS

- **ANAPHASE**: EACH DUPLICATED CHROMOSOME SEPARATED INTO SINGLE CHROMOSOMES (CHROMATIDS).
- **TELOPHASE/CYTOKINESIS**: NUCLEUS REFORMS AROUND SINGLE CHROMOSOMES. ORIGINAL CELL SPLIT INTO 2 CELLS.

## MEIOSIS

- **ANAPHASE 1**: PAIRS OF DUPLICATED HOMOLOGOUS CHROMOSOMES (TETRADS) SEPARATED INTO DUPLICATED HOMOLOGOUS CHROMOSOMES.
- **TELOPHASE/CYTOKINESIS 1**: NUCLEUS REFORMS AROUND HOMOLOGOUS CHROMOSOMES. ORIGINAL CELL SPLIT INTO 2 CELLS.



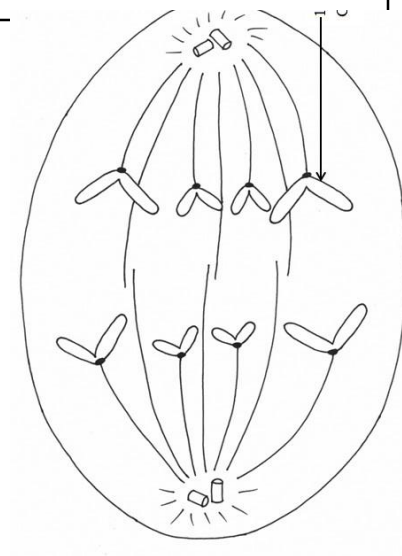
## MEIOSIS 2

- EACH CELL FROM MEIOSIS 1 UNDERGOES INTERPHASE WITHOUT **DNA REPLICATION**.
- DNA IN CELLS IS RECOMBINED FROM CROSSING-OVER.
- ALL PHASES PMATC-2 OCCUR AND APPEAR AS A MITOSIS DIVISION.
- DIFFERENTIABLE ONLY IF RECOMBINATION IS APPARENT OR IF PLOIDY LEVEL INFORMATION PROVIDED.



$n = 4$

Meiosis 2 because  
resulting cells will have  
 $n=4$



$n = 2$

Mitosis because  $2n = 4$  and  
resulting cells will have  $2n =$   
4. Cannot be meiosis  
because if meiosis 1, tetrads  
would be separating.